

AN ANALYSIS OF A SERIES OF 500 CONSECUTIVE
OPERATIONS FOR

PRIMARY CATARACT

PERFORMED IN FIVE MONTHS IN THE GOVERNMENT
OPHTHALMIC HOSPITAL, MADRAS.

BY

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FROM this series all secondary cataracts are excluded. I have also excluded 16 cases in which, though the cataract was presumably primary, the indication for extraction of the lens was the relief of an acute glaucoma which had already destroyed, or nearly destroyed, vision. Five cases in which cataractous lenses which had been couched by native practitioners were removed will be published separately. No other class of cases is excluded and no patient was refused operation provided that there was even a small chance of improving his vision. This explains the failures under the head of "black cataracts"; these were submitted to operation with considerable hesitation.

The cataract-operation day in the Government Ophthalmic Hospital, Madras, is Saturday and the cases coming in during the week are kept for that day. The smallest number operated on in one day was 13 and the largest was 53. On three other occasions more than 40 cataracts were extracted in one morning. In all 464 cases were operated upon on 17 Saturdays, giving an average of a little over 27 per diem. The remaining 36 cases were done on the general operation day (Tuesday) and were mostly cases of very immature cataract which it was thought advisable to relegate to that day in order to avoid too much delay on the

cataract day, as the washing out of an immature case often takes a long time. These 36 cases were operated upon on 13 Tuesdays. The whole series of operations were performed between June 22nd and Nov. 2nd, 1901—a period of 19 weeks. On an average from 12 to 16 patients were operated upon in an hour, the number falling as low as eight when the subjects were refractory and rising on one occasion to 20 when a particularly easy series was in hand. Two tables are used and while an operation is taking place on one, on the other the previous patient is being dressed and the coming one is being prepared. 277 right eyes were operated on and 223 left eyes. Opium was given twice before operation to quiet the patient and morphia was given hypodermically 37 times for the same purpose. The results were excellent. One young child was given chloroform for the two eyes in turn. For my assistant I had the good fortune to have Mr. Collins who, as the assistant surgeon of this hospital for many years, has probably seen more cataracts extracted than any other living man (about 12,000). Such success as I have met with has been largely due to his very skilful and resourceful help and to his able care of the after-treatment which he personally supervised under my instructions. I also owe him my thanks for much valuable help in preparing the statistics of this series. The irrigator was under the care of a student who devoted his whole energies to it for the time being. He was not allowed to touch any other instrument during the operation.

Preparation of instruments, &c.—All instruments used are boiled before and after each operation; the knife and stop-needle are excepted, these being carefully wiped each time with sterile absorbent wool soaked in chinisol solution (1 in 3000). As a large number of cases are operated on every Saturday four sets of instruments, each in a tray, are kept in use and two trays are boiling while one is on the table and one is cooling on a sterilised cloth.

Method of operating.—A spring speculum is inserted and the capsule is lacerated freely by means of a Bowman's stop-needle. Care is taken to tear a free aperture in the centre of the dilated pupil. The section is made in the sclero-corneal margin and varies in size from just under half the circumference to less than a quarter of the same. One always endeavours to graduate the section according to the size of the lens, making it large for bulky hard cataracts

(nuclear), medium for cortico-nuclear cataracts, and small for Morgagnian or soft cataracts. It is held to be a cardinal principle of successful operation for cataract that the incision should be sufficiently large and that it is well always to err on the large side when in doubt. An iridectomy is performed, the object being not to make a wide section, but to remove the whole depth of iris over a narrow area, thus providing a safety sluice-gate for the aqueous humour should the section burst during the after treatment. The nucleus and any cortex which readily escapes with it are delivered by manipulation and the speculum is at once removed. The chamber is washed clear of cortical débris, blood, &c., by MacKeown's irrigator, the stream being first directed backward under the iris for this purpose; as soon as the chamber is seen to be clear of cortex the iris is replaced by directing a stream of water along its front surface, the point of the nozzle being at the same time inserted into the angle of the wound to release any iris impacted there. The eye is closed by means of a pad of lint wrung out in chinosol solution (1 in 3000), a pad of sterile cotton wool fills up the cup of the orbit, and finally a firm bandage is applied.

After-dressing.—Each case is inspected and dressed daily after operation; if all is going well a minimum of interference is indulged in; any discharge is gently sponged away and the lids are opened to let out retained aqueous and at once closed again. Any complications are treated as they arise. Atropine solution (four grains of the sulphate to the ounce) is instilled as a routine measure on the third morning provided there is no contra-indication. The sound eye is left open on the fifth morning and the operated eye is released on the seventh day if it is doing well. The patient is discharged from hospital on the seventh day and is directed to attend as an out-patient for another two weeks. Vision is tested on the day of discharge with Snellen's dots for near and far distance. Only spheres are used for the testing, and + 10 and + 16 are principally relied on. Press of work forbids a more elaborate test being applied. (Further remarks on this subject will be found at the end of this paper.) In cases of double cataract the second eye is, in the absence of any contra-indication, operated on one week after the first. The most favourable eye is always selected first. No case is permitted to leave hospital in which there is the slightest evidence of ciliary congestion

or of iritis. Such cases, which are fortunately few in number, are detained as in-patients till the eye is absolutely quiet. A little catarrh, unaccompanied by pain or photophobia, is not an uncommon complication of convalescence; this does not prevent the patient being discharged and I have no recollection of having ever seen any harm come of it.

Preparation of the patient.—In an Indian hospital, with many waiting for every empty bed, it is not possible to keep a patient long under observation before operation. Inflammations of the conjunctiva are carefully seen to. The common type met with was a very subacute catarrh, which was dealt with by the daily application of a solution of nitrate of silver (three grains to the ounce). Lacrymal obstruction was always dealt with beforehand when possible, but provided that the discharge on pressure was clear and non-purulent an operation was not deferred after dilatation of the stricture. In addition to the measures suggested by ordinary cleanliness the lashes of the temporal half of the upper lid were cut the day previous to operation in order to avoid soiling the knife during operation. For hospital patients atropine is used on the day before operation, while for private patients homatropine is used. The distinction is due to the necessity for taking notes of so large a number of cases previously to operation and to other equally obvious needs imposed by routine when dealing with 30 or more operation cases in a day. For quiet patients cocaine suffices and the majority do not appear to suffer any pain from the operation, even though an iridectomy is performed; when patients are nervous morphia (from a quarter to one-third of a grain subcutaneously a quarter of an hour before operation) is invaluable. Whenever a patient gives trouble with the first eye or will not lie quiet when brought on the table he is given morphia. The result is marvellous. He then lies still and obeys every order, making the operation easy and safe. The eye is freely irrigated with chinosol solution (1 in 5000) immediately before the operation. Any flakes of mucus are removed with cotton-wool sponges mounted on sticks and carefully sterilised beforehand by boiling. The method of irrigating the conjunctival sac with perchloride of mercury was carefully tried; the resulting congestion was so great that the method was abandoned as introducing a fresh danger into the operation. This was doubtless due to the quality of the perchloride supplied.

Complications met with before operation —(1) Conjunctival congestion or catarrh, 261, or 52·2 per cent. ; (2) pterygium, 37, or 7·4 per cent. ; (3) irido-donesis, 7, or 1·4 per cent. ; (4) partial dislocation of the lens, 1, or 0·2 per cent. ; (5) opacities of the cornea, 10, or 2·0 per cent. ; (6) lacrymal obstruction (treated before operation), 2, or 0·4 per cent. ; (7) posterior synechia, 6, or 1·2 per cent. ; (8) nystagmus, 2, or 0·4 per cent. ; (9) increase of tension over normal (often very slight), 80, or 16·0 per cent. ; (10) diminution of tension below normal, 10, or 2·0 per cent. ; and (11) iridectomy performed some time previously, 2, or 0·4 per cent.

1. Of the 261 cases in which there was catarrh or congestion of the conjunctiva 13 showed septic infection, or 4·98 per cent., while of the remaining 239 cases in which there was no conjunctival trouble 6 showed septic infection, or 2·51 per cent. The following is an analysis of these cases. In the 261 catarrhal cases panophthalmitis occurred in 2, or 0·766 per cent. ; suppurative iritis in 4, or 1·532 per cent. ; suppurative keratitis in 4, or 1·532 per cent. ; and severe iritis in 3, or 1·148 per cent. In the 239 cases without catarrh panophthalmitis occurred in 1, or 0·418 per cent. ; suppurative iritis in 1, or 0·418 per cent. ; suppurative keratitis in 2, or 0·836 per cent. ; and severe iritis in 2, or 0·836 per cent.

N.B.—I regret to have to confess that in the earlier cases of this series I operated on a number in which slight congestion of the conjunctiva was present without submitting them to preliminary treatment ; warned by several septic results I thereafter treated every case of congestion with as much care as if it had been one of catarrh and with happy results.

2. Of the 37 cases of pterygium four inflamed after the extraction of the cataract ; all eventually had good sight.

3. The cause of irido-donesis was probably the relaxation of the zonule of Zinn, in long-standing cataract, in most instances, but in such cases one always suspects an unsuccessful attempt to couch ; couching of the lens is a common proceeding amongst native practitioners. In five of the seven cases the capsule was not needled, the lens being delivered entire ; in two cases the capsule was needled, and in one iritis ensued and the patient recovered with only perception of light. The remaining six had good vision.

4. The dislocated lens was delivered by manipulation ; a bead of vitreous presented and was excised ; vision was M.B.E. at 1·5 metres.

6. The two cases of lacrymal obstruction were treated before operation and both did well after extraction.

7. Of the six cases of posterior synechiæ the vectis was used in two to effect delivery ; in one one-sixth of the vitreous was lost and vision was M.B.E. at 1·75 metres ; in the second case the vision was lost owing to iritis. In a third case the iridectomy forceps was used to remove a thickened anterior capsule before delivery ; vision was M.B.E. at one metre. In the other three the lens was easily delivered and vision was M.B.E. at 1·5 metres, three metres, and 4·5 metres respectively.

9. 80 cases showed increased tension beforehand. The results of operation were as follows : M.B.E. at from one to six metres (i.e., $\frac{1}{100}$ ths upwards), 71, or 88·75 per cent. ; counted fingers at from one to two metres, 4, or 5·00 per cent. ; perception of light only, 1, or 1·25 per cent. ; and vision lost, 4, or 5·00 per cent. Of the 4 cases in which vision was lost 3 had catarrh of the conjunctiva beforehand and all were lost by suppuration. The case which ended in perception of light only was a black cataract.

10. Diminution of tension occurred in 10 cases ; visual results were as follows : M.B.E. at from one to three metres, 7, or 70 per cent. ; counted fingers at six inches, 1, or 10 per cent. ; counted fingers at two feet, 1, or 10 per cent. ; and perception of light only after iritis, 1, or 10 per cent. Remembering that the first series of cases was adversely affected by conjunctival trouble the results support the belief that low tension is a more unfavourable factor than high tension in cataract extraction.

11. The 2 cases of preliminary iridectomy both did well.

Complications which occurred during operation.—(1) Lens would not present and was delivered by vectis, 11, or 2·2 per cent. ; (2) lens rotated during delivery, 10, or 2·0 per cent. ; (3) a tremulous lens delivered by vectis, 1, or 0·2 per cent. ; (4) lens became dislocated during operation and was delivered by manipulation, 9, or 1·8 per cent. ; (5) lens de-

livered automatically by the patient squeezing the eye, 11, or 2·2 per cent. ; (6) lens delivered entire in capsule, 15, or 3·0 per cent. ; (7) delivery of lens assisted by traction with forceps, 2, or 0·4 per cent. ; (8) iridectomy incomplete (i.e., not reaching to the base of the iris), 9, or 1·8 per cent. ; (9) iridectomy performed after delivery of lens, 8, or 1·6 per cent. ; (10) iridectomy performed during section by knife, 19, or 3·8 per cent. ; (11) section too small for easy delivery, 10, or 2·0 per cent. ; (12) laceration of capsule proved difficult, 5, or 1·0 per cent. ; (13) capsule not lacerated, 6, or 1·2 per cent. ; (14) capsule removed by the aid of forceps, 26, or 5·2 per cent. ; (15) irido-dialysis due to sudden violent movements of patients, 5, or 1·0 per cent. ; (16) inelasticity of the cornea, 4, or 0·8 per cent. ; (17) hyphæmia, 13, or 2·6 per cent. ; (18) loss of vitreous, 10, or 2·0 per cent. ; (19) knife introduced with edge the wrong way, 1, or 0·2 per cent. ; and (20) knife entangled in iris and had to be withdrawn and reintroduced, 3, or 0·6 per cent.

The following is a short analysis of the above complications :—

1. *Lens would not present ; vectis delivery*, in 11 cases ; four failed due to suppuration. Vision was good in two and poor in five. The vectis was sterilised in a flame in every case before introduction. I now avoid the use of this instrument if I possibly can do so.

2. *Lens rotated during delivery* in 10 cases ; the vectis was employed to complete delivery in two cases ; four had subsequent keratitis ; two had slight iritis ; in one there was prolapse of the iris ; and three made an uninterrupted recovery. M.B.E. vision = from one to two metres in six cases, = from two to three metres in three cases, and = four metres in one case.

3. *A tremulous lens delivered by vectis*, with loss of one-sixth of the vitreous. Vision = M.B.E. at 1·75 metres.

4. *Lens dislocated during delivery ; removed by manipulation*, nine cases ; four had subsequent keratitis ; in one the iris became impacted in the wound ; in one case there were prolapse and occlusion of the pupil, for which iridotomy was done later ; and in one iridectomy was performed after delivery

of the lens. All recovered sight. Vision = M.B.E. at from one to two metres in seven cases, and from 2·25 to three metres in two cases.

5. *Lens delivered by patient squeezing the eye* in 11 cases. Five made uninterrupted recoveries ; in one there was slight chemosis ; two had a tag of iris caught in section, which subsequently required excision ; in one during an iridectomy after expulsion of lens the patient moved suddenly and detached part of the iris-base, some vitreous escaping ; in one iridectomy was done after delivery of the lens and keratitis with faulty apposition of the flap ensued ; and in one the iridectomy was partial and the conjunctiva was congested during the after-treatment. Vision = M.B.E. at from one to two metres in four cases, at from 2·5 to 3·5 metres in six cases, and at six metres in one case.

6. *Lens delivered entire in capsule* in 15 cases ; four made an uninterrupted recovery ; two cases were not needed as the lens was tremulous and they made an uninterrupted recovery ; in one case an attempt was made to lacerate the capsule with the needle and repeated with the knife, and both failed, but an uninterrupted recovery followed ; in one partial iridectomy was performed, with uninterrupted recovery ; in one the section leaked ; in one the patient jerked the knife out during the section and a tag of iris caught in the section was subsequently excised ; in one the patient jerked the knife out and there was slight keratitis during convalescence ; in two there was slight catarrh and in one slight keratitis during convalescence ; and in one there was a slight escape of vitreous followed by keratitis. Vision = M.B.E. at from one to two metres in seven cases, from 2·25 to three metres in four cases, and from 3·25 to four metres in four cases.

7. *Delivery of lens by traction with forceps* in two cases ; in one a disc of degenerated dried-up lens substance in its capsule was seized and removed bodily by means of iris forceps ; vision = fingers at three feet ; in one a black capsulo-lenticular cataract which proved to be very bulky was helped out by traction with conjunctival forceps ; vision = perception of light only.

8. *Iridectomy incomplete* in nine cases ; one suppurated ; in one the lens was delivered in capsule ; in one there was

slight catarrh; in one the section leaked; and five made an uninterrupted recovery. Vision = M.B.E. at from one to two metres in three cases, from 2·5 to three metres in three cases, six metres in two cases, and 0 in one case.

9. *Iridectomy after delivery of lens* in eight cases; all of these were very nervous patients who squeezed out the lens as soon as the section was completed and so gave no chance of doing the iridectomy in its usual order; three made an uninterrupted recovery; two had slight catarrh; one had prolapse of the iris, calling for subsequent excision; one had an escape of vitreous; and in one the flap slid down and there was slight keratitis. Vision = M.B.E. at from one to two metres in four cases, and from 2·5 to three metres in four cases.

10. *Involuntary iridectomy during section* in 19 cases. In three the chamber was very shallow; in one a sudden movement of the patient caused the escape of the aqueous and the iris had to be transfixed in order to introduce the knife across the chamber; and in 15 cases the patient would not look down at all or else made sudden upward movements during section. Six cases recovered without interruption, four had slight catarrh, in three tags of the iris prolapsed, in three there was hyphæmia, in one the section leaked, in one vitreous escaped, and one suppurated. Vision = M.B.E. at from one to two metres in eight cases, from 2·25 to three metres in six cases, 3·5 metres in two cases, and six metres in one case. Fingers were seen at one metre in one case and there was no vision in one case.

11. *Section too small* in 10 cases; in one case the section had to be enlarged and there was subsequent keratitis; in two cases the sections leaked; four made an uninterrupted recovery; two suppurated (the vectis was used in one); and one had escape of vitreous and subsequent irido-cyclitis. Vision = M.B.E. at from one to two metres in six cases, 3·5 metres in one case, and 0 in three cases.

12. *Laceration of the capsule was difficult* in five cases; in three it was lacerated with the knife (in one of these the whole of the iris was caught and torn away by the irrigating scoop owing to a sudden movement of the patient at a time when an unskilful assistant had neglected to keep a stream of water flowing through the nozzle), and in one the lens

was delivered in its capsule. Vision = M.B.E. at from 2·5 to three metres in three cases, fingers at two feet in one case, and 0 in one case.

13. *Failure to lacerate capsule* in six cases ; in one vectis delivery, with slight escape of vitreous, and subsequent keratitis ; in one vectis delivery of a tremulous dislocated lens with loss of one-sixth of vitreous ; and in four tremulous lenses delivered by manipulation. Vision = M.B.E. at from 1·75 to two metres in three cases, 3·5 metres in one case, and fingers could be seen at two metres in one case and no vision in one case.

14. *Capsule removed by aid of forceps* in 26 cases ; 15 cases made an uninterrupted recovery ; two had keratitis ; three had slight escape of vitreous ; three had slight congestion of the conjunctiva ; and in three the section did not unite for two or three days. Vision = fingers at from one to two feet in two cases ; = M.B.E. at from one to two metres in 15 cases, from 2·5 to three metres in six cases, 3·75 metres in one case, and six metres in two cases.

15. *Irido-dialysis* due to violent movements of the patients in five cases ; in one the whole iris was torn out ; there was a large escape of vitreous and severe hæmorrhage. The patient made an easy recovery with only perception of light. In four the detachment was only partial ; one had slight escape of vitreous with subsequent prolapse of the iris and one had slight keratitis. Vision of the four = M.B.E. at one metre in one case, 1·5 metres in two cases, and 3·5 metres in one case.

16. *Cornea inelastic* in four cases ; they all made uninterrupted recoveries and vision in all four cases was M.B.E. at 1·5 metres.

17. *Hyphæmia as a result of operation* in 13 cases ; four occurred in patients who made violent movements during iridectomy ; all did well. Vision = M.B.E. at from one to two metres in nine cases and from 3·5 to four metres in four cases.

18. *Loss of vitreous* in 10 cases ; in three the vectis was employed ; in one the section was enlarged, the patient being very restless during the operation ; in two the patient

squeezed the eye violently ; in one the patient made violent movements and entire irido-dialysis resulted ; and in three there was slight irritability of the eye during recovery. Vision = M.B.E. at from one to two metres in five cases, at 2·5 metres in one case, perception of light only in three cases, and fingers at two metres in one case.

19. *Knife introduced wrong way up* in one case ; it was removed and reintroduced and the patient made an uninterrupted recovery. Vision = M.B.E. at 1·5 metres.

20. *Knife entangled in iris and had to be withdrawn and reintroduced* in three cases ; in one a capsulotomy had to be done subsequently. Vision = M.B.E. at from one to two metres in two cases and three metres in one case.

Complications in the after-treatment of the cases.—(1) Prolapse of the iris occurred in 25, or 5 per cent. ; (2) keratitis in 56, or 11·2 per cent. ; (3) leaking of section in 49, or 9·8 per cent. ; (4) mal-apposition of the flap in 5, or 1 per cent. ; (5) suppurative keratitis in 6, or 1·2 per cent. ; (6) suppurative iritis in 5, or 1 per cent. ; (7) panophthalmitis in 3, or 0·6 per cent. ; (8) severe iritis (possibly septic) in 5, or 1 per cent. ; (9) subacute iritis in 9, or 1·8 per cent. ; (10) hæmorrhage into the anterior chamber in 20, or 4 per cent. ; (11) cystoid cicatrix in 1, or 0·2 per cent. ; (12) bulging section in 1, or 0·2 per cent. ; (13) section burst by patient in 6, or 1·2 per cent. ; (14) pterygium congested in 3, or 0·6 per cent. ; and (15) spasmodic entropion in 2, or 0·4 per cent.

1. *Prolapse of the iris* occurred 25 times, or in 5 per cent. The 500 cases may be divided into two groups : (*a*) those operated on with iridectomy, numbering 484 ; and (*b*) those operated on without iridectomy, numbering 16. In group (*a*) prolapse of the iris occurred 21 times, or in 4·33 per cent. ; and the prolapse was abscised 12 times, or in 2·48 per cent. In group (*b*) prolapse of the iris occurred four times, or in 25 per cent. ; and the prolapse was abscised three times, or 18·75 per cent.

N.B.—The percentages are calculated on the totals of each group. The very high ratio in the second group is due to the fact that these are almost all cases in which the patient was troublesome at the time of operation and so iridectomy could

not be done ; several of them expelled their lenses by violent squeezing as soon as the section was completed. Such a series will of course give a high prolapse rate. The symptoms of prolapse in the cases of combined operation were never as severe as those met with after the simple operation, and the abscission of the impacted tag of iris was a comparatively safe procedure. All the four cases in which prolapse occurred after the simple operation did well and had good vision, but it is to be remembered that the series is a very small one. Of the 21 cases of prolapse of tags of iris after the combined operation 19 recovered with good vision and two could only count fingers at one metre ; there were other complications in both these cases.

2. *Keratitis* occurred in 56 cases, or 11·2 per cent. This was mostly of a mild type and in no way influenced the course of the case. In 48 cases the patients had excellent vision, in seven cases they could only count fingers at from one to two metres, and in one there was only perception of light. The last-mentioned case was complicated with iritis ; of the seven cases one had a large central opacity of the cornea before operation, one was complicated with iritis and iridotomy gave a good aperture, and five were steadily clearing on discharge, and as the eyes were otherwise quiet and beds were needed they were discharged to attend as out-patients and were not again tested. It is probable that they all recovered good vision.

The question arises as to whether the irrigation of the anterior chamber was responsible for the poor result in these cases. I certainly do not think so, but in any case before considering this point we must eliminate the two cases with iritis and two others—viz., one in which a vectis was used to effect delivery and one in which a large lens was with difficulty squeezed through a narrow section. This leaves less than 1 per cent. of poor results to be set down possibly against irrigation ; the possibility is not, I think, a probability. I believe irrigation to be an absolutely harmless procedure.

3. *The section remained open* for several days in 49, or 9·8 per cent. In one case it remained open two days ; in three cases it remained open three days ; in 12 cases it remained open four days ; in 12 cases it remained open five days ; in three cases it remained open six days ; in 10 cases it

remained open from seven to nine days; in two cases it remained open 12 days; in one case it remained open 16 days; and in three cases the time is not marked—total, 47 cases, all of which did well. The remaining two cases suppurated; in one the section was ununited on the fourth day and then suppuration set in; there had been slight congestion before operation; the other case had normal conjunctiva before operation; the section remained open till the fifth day, then closed, and the eye was doing well when the patient had a sudden attack of violent diarrhoea on the tenth day which ended fatally on the eleventh day; the cornea looked well till the diarrhoea set in and then suppurated, apparently as the result of the exhausting complication. The fatal termination was due to an intercurrent disease which was unconnected with the operation. The loss of one eye only must be debited to “leaking section,” a percentage loss of 0·5.

4. *Mal-apposition of flap* occurred in five cases; it was well replaced in three cases; this complication was met with in patients with an inelastic eye, or in those who gave a good deal of trouble at the operation, hampering the toilet of the wound. Vision was good in four cases and poor in one.

5 to 8. *Inflammations of septic or presumably septic type* have been already dealt with under the heading of Pre-operative Conjunctival Complications. It is, however, to be remembered that it is very difficult to eliminate suppuration in a country where the patient deliberately raises the bandage and rubs his eye; many of the more ignorant natives look on the surgeon as a man whose “fads” are to be “dodged” if possible.

9. It is hard to localise the cause of the *slighter forms of iritis* in people, many of whom can give no past history of their life. Six of the nine cases recovered with useful vision, while three could only succeed in counting fingers.

10. *Hæmorrhage into the anterior chamber*; this occurred in 20 cases and may probably be put down in every case to the patient rubbing the eye. The results were good in all, but it is likely that a subsequent capsulotomy would have been an advantage in many of them; the patients would not think of waiting for this. The same remarks apply equally to the six cases in which the section was burst by the patient.

11. In one case the *section became cystoid* and as pressure by bandages failed to relieve the condition the bulging section was freely cut away; the incision then healed soundly with good vision.

12. The section continued to bulge in one case till the wound was reopened and a bead of vitreous let out. This was done on the fourteenth day and the wound at once united. This was not a case of cystoid cicatrix; the hyaloid, presumably under external muscular pressure, pushed the section open and bulged through.

14. *The congestion of pterygia* never led to any serious results in this series.

15. *Spasmodic entropion* occurred in two cases, in old people with relaxed lids; in both cases it set up keratitis; the bandages were at once removed, with speedy relief of the symptom; one got good, and the other poor, sight.

Capsulotomy was performed in 11 cases. It was done with two needles a month after the operation and when the eye was quite quiet. Good vision was obtained in all cases. In an experience of 2000 extractions I have never seen any trouble follow this little operation so far as I can recollect, and I have performed it whenever I found it to be necessary. Iridotomy was reserved for a less tractable class of cases; it was done twice for blocked pupil following iritis, with poor results; twice for the results of prolapse of the iris, with one good and one poor result; once for the purpose of establishing a pupil in a case in which the iris was drawn upwards after an escape of vitreous with a good result; and once to restore vision in a case of much thickened capsule, with a good result.

Nature of Cataract.

Nuclear	106
Cortico-nuclear	326
Morgagnian	59
Shrunken cataracts	3
Soft	5
Post-polar	1
<hr/>	
Total	500

The number of cases in which the irrigator was used was

460 and the number of cases in which the irrigator was not used was 40—total, 500.

N.B.—In a few cases the irrigator was not used either because the chamber was clear and the iris in good position or because a minimum of interference with the eye was indicated. The bulk of the 40, however, were performed before the irrigating apparatus was available.

Visual results after operation.—Spheres only were used and the patients were tested with miniature bull's eyes (M.B.E.) at distances from one to six metres. A vision of M.B.E. at six metres equals $\frac{6}{10}$ vision by types or rather more. This result has been obtained by careful comparative experiments with educated patients. The cases were tested on discharge as it is impossible to test so many cases except by strict routine. A percentage were got hold of later and re-tested and none of these had degenerated in vision after the testing, while many had improved greatly.

Visual Results.

Could count fingers from 1 foot to 2 metres ...	17	or 3·4 per cent.
Counted M.B.E. at 1 to 2 metres	260	
" " 2·25 " 3 "	107	
" " 3·25 " 4 "	44	} 91·4 "
" " 4·25 " 5 "	15	
" " 5·5 " 6 "	31	
Good vision in a child too young to apply any test	2	0·4 "
Vision perception of light or <i>nil</i>	24	4·8 "

Near Vision.

Could not count Jaeger's type dots, but counted fingers	17
Counted No. I. Jaeger dots	69
" No. II. " "	31
" No. III. " "	11
" No. VI. " "	132
" No. VIII. " "	102
" No. X. " "	102
" No. XII. " "	5
" No. XIV. " "	5
Child could not read, so untested	2
No vision or only perception of light	24
Total	500

The following is an analysis of the causes of poor vision in the 17 cases : subacute iritis, three cases, counted fingers at from one to six feet ; cases necessitating an iridotomy, three, counted fingers at from one-half to two feet ; keratitis, seven cases, counted fingers at from one to six feet ; prolapse of iris (secondary operation), one case, counted fingers at three feet ; inelastic eye with mal-apposition of section, one case, counted fingers at three feet ; and pupil blocked with absorbing cortex at the time of discharge, two cases, counted fingers at three feet.

The following is an analysis of the causes of failure. Panophthalmitis occurred in three cases, or in 0·6 per cent. ; suppurative iritis occurred in five cases, or in 1·0 per cent. ; suppurative keratitis occurred in six cases, or in 1·2 per cent. ; severe iritis occurred in five cases, or in 1·0 per cent. ; secondary changes associated with black cataract occurred in four cases, or in 0·8 per cent. ; and large escape of vitreous in one case, or in 0·2 per cent.—total, 24 cases, or 4·8 per cent.

N.B.—Of seven black cataracts operated on, one counted fingers at one metre, one counted M.B.E. at 1·5 metres, and five were not improved by the operation, the failure being due to iritis in one case and to secondary changes in the coats of the eye in four cases.

I have refrained from commenting on this series as far as possible, leaving the facts to speak for themselves, and delaying remarks till after the publication of 300 more cases. It would, however, be an act of discourtesy to Professor McKeown of Belfast if I omitted to acknowledge the debt I owe him for allowing me to witness his method of using the irrigating apparatus which bears his name and which has since given me the best results I have yet had in cataract extraction. The irrigator has reduced the vitreous losses of this series to 2 per cent. ; by emptying the capsule and chamber of débris it has minimised the need for subsequent capsulotomy and has enabled me to dispense with the introduction of instruments into the eye after the escape of the nucleus ; it has been of great value in clearing the chamber of blood, &c., and so facilitating the subsequent steps of the operation in a class of cases which otherwise are liable to prove hazardous ; by gently and evenly replacing the iris (even when impacted in the edges of the section) it has been most valuable, and it has expedited recovery

inasmuch as it left behind so little cortex to be absorbed. Finally, it has enabled me to operate fearlessly on a large number of very immature cataracts which, before using it, I could not have ventured to interfere with. Against these marked advantages I know of no disadvantage which it possesses.

Madras.

